IN THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of the Claims:

1. (Currently amended) A method of grading tubules in a first image of a histological ~~slide~~ specimen, the method comprising using computer apparatus to carry out the steps of:

a) providing a second image ~~of~~ distinguishing first objects in the first image which are sufficiently large to indicate potential tubules and have pixel values at boundaries indicating epithelial layers ~~and potential tubules~~,

b) providing a third image ~~of~~ distinguishing second objects in the first image ~~having~~ which have pixel values not indicating epithelial layers but instead fat and holes within tubules,

c) combining data from the second and third images to identify as holes within tubules those ~~selected~~ contained second objects which are contained within first objects by excluding objects not indicated to have epithelial layers and first objects not containing second objects,

d) performing one or more of the following:

i) ~~counting first objects in the first image which may potentially be tubules to provide a number of objects parameter, ii)~~ counting as tubules those of the first objects which have ~~selected~~ contained second objects within them to provide a number of tubules parameter,

ii) counting the first objects to provide a number of objects parameter and determining a parameter expressing the number of tubules parameter as a proportion of the number of objects parameter,

iii) determining the relative areas of the ~~selected~~ contained second objects as proportions of respective first objects within which they are located to provide respective ratio parameters,

iv) determining the total area of ~~selected~~ contained second objects as a proportion of total area of first objects within which they are located to

provide a surface area ratio parameter, ~~v) determining a parameter expressing the number of tubules parameter as a proportion of the number of objects parameter,~~ and ~~vi)~~

v) counting the number of first objects containing at least medium sized holes to provide a tubules parameter,

e) grading the first image's tubules on the basis of the one or more parameters as aforesaid with reference to parameter threshold values, and

f) using the grading of the first image's tubules to provide a tubule score for use in diagnosis.

2. (Currently amended) A method according to Claim 1 wherein the step of providing a second image incorporates:

a) thresholding the first image to provide a ~~fourth~~ thresholded image retaining relatively darker image pixels and rejecting relatively lighter image pixels,

b) inverting the ~~fourth~~ thresholded image to provide inverted image data,

c) morphologically dilating the inverted image data to provide dilated image data,

d) median filtering the dilated image data to provide filtered image data,

e) hole filling the filtered image data to provide filled image data, and

f) morphologically opening the filled image data.

3. (Previously presented) A method according to Claim 1 wherein the step of providing a third image comprises thresholding the first image to provide a binary fourth image in which relatively lighter image pixels have a different binary value to that of relatively darker image pixels.

4. (Previously presented) A method according to Claim 1 wherein the step of combining data from the second and third images comprises:

a) either multiplying each pixel in the second image by a respective corresponding pixel located in a like position in the third image, or

b) implementing a logical AND operation between each pixel in the second image and a respective pixel located in a like position in the third image.

5. (Previously presented) A method according to Claim 1 wherein the step of grading the first image's tubules employs parameter threshold values set to obtain a grading comparable with that obtainable by an appropriate medical expert.

6. (Deleted)

7. (Currently amended) Apparatus for grading tubules in a first image of a histological specimen, the apparatus incorporating a microscope and a camera for photographing a histopathological specimen to obtain digitised colour image data, and computer means for receiving the digitised colour image data, the computer means being programmed to:

a) compute a second image ~~of~~ distinguishing first objects in the first image which are sufficiently large to indicate potential tubules and have pixel values at boundaries indicating epithelial layers ~~and potential tubules~~,

b) compute a third image ~~of~~ distinguishing second objects in the first image ~~having~~ which have pixel values not indicating epithelial layers but instead fat and holes within tubules,

c) combine data from the second and third images to identify as holes within tubules those ~~elected~~ contained second objects which are contained within first objects by excluding objects not indicated to have epithelial layers and first objects not containing second objects,

d) implement one or more of the following:

i) ~~counting first objects in the first image which may potentially be tubules to provide a number of objects parameter, ii)~~ counting as tubules those of the first objects which have ~~selected~~ contained second objects within them to provide a number of tubules parameter,

ii) counting the first objects to provide a number of objects parameter and determining a parameter expressing the number of tubules parameter as a proportion of the number of objects parameter,

iii) determining the relative areas of ~~selected~~ contained second objects as proportions of respective first objects within which they are located to provide respective ratio parameters,

iv) determining the total area of ~~selected~~ contained second objects as a proportion of total area of first objects within which they are located to provide a surface area ratio parameter, ~~v) determining a parameter expressing the number of tubules parameter as a proportion of the number of objects parameter,~~ and ~~vi)~~

v) counting the number of first objects containing at least medium sized holes to provide a tubules parameter,

e) grade the first image's tubules on the basis of the one or more parameters as aforesaid with reference to parameter threshold values, and

f) use the grading of the first image's tubules to provide a tubule score for use in diagnosis.

8. (Currently amended) Apparatus according to Claim 7 wherein the computer means is programmed to provide a second image by:

a) thresholding the first image to provide a ~~fourth~~ thresholded image retaining relatively darker image pixels and rejecting relatively lighter image pixels,

b) inverting the ~~fourth~~ thresholded image to provide inverted image data,

c) morphologically dilating the inverted image data to provide dilated image data,

d) median filtering the dilated image data to provide filtered image data,

e) hole filling the filtered image data to provide filled image data, and

f) morphologically opening the filled image data.

9. (Previously presented) Apparatus according to Claim 7 wherein the computer means is programmed to provide a third image by thresholding the first image to provide a binary fourth image in which relatively lighter image pixels have a different binary value to that of relatively darker image pixels.

10. (Previously presented) Apparatus according to Claim 7 wherein the computer means is programmed to combine data from the second and third images:

a) either by multiplying each pixel in the second image by a respective corresponding pixel located in a like position in the third image, or

b) by implementing a logical AND operation between each pixel in the second image and a respective pixel located in a like position in the third image.

11. (Previously presented) Apparatus according to Claim 7 wherein the computer means is programmed to grade the first image's tubules with parameter threshold values set to obtain a grading comparable with that obtainable by an appropriate medical expert.

12. (Deleted)

13. (Currently amended) A computer software product comprising a carrier medium encoded with computer readable instructions and for use in grading tubules in a first image of a histological ~~slide~~ specimen, the carrier medium not being a non-physical carrier medium, and the computer readable instructions being for controlling computer apparatus to:

a) compute a second image ~~of~~ distinguishing first objects in the first image which are sufficiently large to indicate potential tubules and have pixel values at boundaries indicating epithelial layers ~~and potential tubules~~,

b) compute a third image ~~of~~ distinguishing second objects in the first image ~~having~~ which have pixel values not indicating epithelial layers but instead fat and holes within tubules,

c) combine data from the second and third images to identify as holes within tubules those ~~elected~~ contained second objects which are contained within first objects by excluding objects not indicated to have epithelial layers and first objects not containing second objects,

d) implement one or more of the following:

i) ~~counting first objects in the first image which may potentially be tubules to provide a number of objects parameter, ii)~~ counting as tubules those of the first objects which have ~~selected~~ contained second objects within them to provide a number of tubules parameter,

ii) counting the first objects to provide a number of objects parameter and determining a parameter expressing the number of tubules parameter as a proportion of the number of objects parameter,

iii) determining the relative areas of ~~selected~~ contained second objects as proportions of respective first objects within which they are located to provide respective ratio parameters,

iv) determining the total area of ~~selected~~ contained second objects as a proportion of total area of first objects within which they are located to provide a surface area ratio parameter, ~~v) determining a parameter expressing the number of tubules parameter as a proportion of the number of objects parameter,~~ and ~~vi)~~

v) counting the number of first objects containing at least medium sized holes to provide a tubules parameter,

e) grade the first image's tubules on the basis of the one or more parameters as aforesaid with reference to parameter threshold values, and

f) use the grading of the first image's tubules to provide a tubule score for use in diagnosis.

14. (Currently amended) A computer software product according to Claim 13 wherein the computer readable instructions provide for controlling computer apparatus to compute a second image by:

a) thresholding the first image to provide a ~~fourth~~ thresholded image retaining relatively darker image pixels and rejecting relatively lighter image pixels,

b) inverting the ~~fourth~~ thresholded image to provide inverted image data,

c) morphologically dilating the inverted image data to provide dilated image data,

d) median filtering the dilated image data to provide filtered image data,

e) hole filling the filtered image data to provide filled image data, and

f) morphologically opening the filled image data.

15. (Previously presented) A computer software product according to Claim 13 wherein the computer readable instructions provide for controlling computer apparatus to compute a third image by thresholding the first image to provide a binary fourth image in which relatively lighter image pixels have a different binary value to that of relatively darker image pixels.

16. (Previously presented) A computer software product according to Claim 13 wherein the computer readable instructions provide for controlling computer apparatus to combine data from the second and third images:

a) either by multiplying each pixel in the second image by a respective corresponding pixel located in a like position in the third image, or

b) by implementing a logical AND operation between each pixel in the second image and a respective pixel located in a like position in the third image.

17. (Previously presented) A computer software product according to Claim 13 wherein the computer readable instructions provide for controlling computer apparatus to grade the first image's tubules with parameter threshold values set to obtain a grading comparable with that obtainable by an appropriate medical expert.

18. (Deleted)